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Agency Secretary

Air Resources Board

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Gray Davis
Governor

December 20, 2002

Mr. Jack Broadbent, Director
Air Division, Region IX
U.S. Environmental Protection Agency
75 Hawthorne Street
San Francisco, California 94105

Dear Mr. Broadbent:

The Air Resources Board (ARB) is transmitting California's current motor vehicle emissions model, EMFAC2002, to the U.S. Environmental Protection Agency (U.S. EPA) and requesting your expedited approval of the model for use in State Implementation Plans (SIP) and transportation conformity in California.

On April 26, 2002, I wrote to inform you and the federal transportation agencies of our accelerated schedule for updating the SIPs and conformity emissions budgets for most of California's nonattainment and maintenance areas. The first critical step in that process is development of emissions inventories, including the update of California's motor vehicle emissions model. EMFAC2002 incorporates the most recent vehicle test data, fleet demographic data and planning information affecting vehicle emissions estimation in California. We expect that this model, with updated activity inputs, will serve the SIP development and conformity processes in California for several years.

The transportation conformity rule requires U.S. EPA to approve the emissions model for SIP purposes before it can be used to determine conformity of a transportation plan or program. We are specifically asking U.S. EPA to approve the emission factor elements of EMFAC2002, but not the default travel activity data included in the model. Each region may update its activity data as part of a SIP revision or subsequent conformity analysis independent of the EMFAC2002 model, and both of these actions require opportunity for public comment and U.S. EPA approval. This letter and its enclosures:

- Describe the major improvements in this model relative to EMFAC7F and EMFAC7G, the models used in approved SIPs in California.
- Review the public process conducted during EMFAC2002 development.
- Describe how the model will be used for SIP development and transportation conformity.
- Identify extensive technical documentation for model users.
- Discuss the common basis for EMFAC2002 and U.S. EPA's current MOBILE6 emissions model.

Model Improvements

Most SIPs in California were developed using vehicle emission models EMFAC7F (released September 1993) or EMFAC7G (released July 1997). In the past five years, over 2000 additional vehicle tests, employing improved vehicle test cycles have been used to develop EMFAC2002. With the release of this model, the motor vehicle inventory benefits not only from a wealth of new quantitative data, but also from key qualitative changes. Enclosure A details the improvements since the EMFAC7F/7G models. The improvements include:

- Updated and comprehensive vehicle fleet information by county. EMFAC2002 includes updated fleet information (like vehicle population, age, weight class, and miles accrued), based on over 30 million registration records that provide the latest complete model year data available as of mid-2002. The model now uses county-specific information, rather than just statewide averages.

- Breadth of model years, vehicle classes and technology groups. EMFAC2002 reflects a fleet over 45 model years, compared to 35 model years for cars and 25 model years for trucks in EMFAC7F/7G. The number of vehicle classes has been expanded from 10 to 13 and the number of technology groups increased from 19 to 277, supporting a more comprehensive understanding of the fleet and the effect of controls.

- Shift from vehicle trips to starts. EMFAC2002 fully incorporates the concept of vehicle starts introduced with EMFAC7G. Redefining the vehicle trip as a more frequent key-on/key-off event rather than being destination-dependent is consistent with ARB and U.S. EPA instrumented vehicle studies. Vehicle start emissions are now considered over the full range of soak times associated with frequent vehicle usage.

- Better heavy-duty truck emission rates. EMFAC2002 accounts for heavy-duty vehicle emissions during extended idling, and during off-cycle operation in 1990s-era engines programmed to favor fuel economy at the expense of higher emissions. The base emission rates are now derived from chassis dynamometer test data for heavy-duty trucks rather than engine dynamometer data. These improvements allow EMFAC2002 to better represent real world emissions, rather than laboratory performance.

- Vehicles Not Registered in California. EMFAC2002 uses the results of California-specific research to provide an updated estimate of unregistered vehicles, as well as out-of-state and Mexican vehicles traveling in California.

- Additional Vehicle and Fuels Controls. Adopted State and federal regulations affecting the motor vehicle inventory are incorporated into the model, including the Low Emission Vehicle II (LEV II) standards, new heavy duty vehicle standards effective in 2004 and 2007, fuel improvements including Phase 3 reformulated gasoline, and revisions to each region's Inspection and Maintenance Program.

In addition to the substantial improvements of the quantitative functionality of EMFAC, we have added a graphical user interface to dramatically improve the user's ability to easily enter data for air quality and transportation plan scenario evaluation, including conformity analyses. A new What-if Scenario (WIS) Generator allows even the lay user of the model to examine the effects of changes in data and assumptions on emissions. For the first time, vehicle emissions modeling need not be an exercise limited to modelers.

Public Process

EMFAC2002 represents more than five years of effort to refine and improve the accuracy of the on-road emissions inventory through continued model development. Key to this effort has been a broad and ongoing public review process. State law requires ARB to present the current motor vehicle inventory triennially in a noticed Board hearing in which the public may comment. In addition to Board review, staff held a series of public workshops to update interested parties on model development and gather input. The most recent workshops, held June 11, 2002 in Sacramento and June 13, 2002 in El Monte, explained the final changes under consideration prior to release of EMFAC2002 and sought public input on those changes. We provided two public information briefings on November 6, 2002 in Sacramento and November 7, 2002 in El Monte, to explain the final results of these changes and plans for transmittal to U.S. EPA.

ARB has distributed and solicited comment on several interim versions of the model since the release of EMFAC7G and prior to the release of EMFAC2002. Enclosure B lists the meetings and workshops conducted to inform model users and other interested parties of the basis for each significant change in EMFAC and of the resulting impacts on emission estimates. Public comment has assisted the model development process, and ARB staff is firmly committed to maintaining a public dialogue as part of our ongoing emissions inventory improvement efforts.

Transportation Conformity Budgets and Analyses

California is currently using EMFAC2002 emission factors, combined with any updated travel activity, to develop SIP revisions and new motor vehicle emissions budgets. These SIPs will be submitted to U.S. EPA following transmittal of the model for approval. Once U.S. EPA acts on the EMFAC2002 model, the Agency can then find the new budgets adequate. U.S. EPA approval of EMFAC2002 will also start a grace period for all regions of California to begin using the new model in conformity analyses. Travel activity updates are an important part of the latest planning assumptions for both the air quality plan and the conformity analysis; these updates serve as input to the EMFAC2002 model. We are developing recommended procedures for using the "WIS" function of EMFAC2002 to readily reflect the vehicle activity provided by local agencies in developing emissions budgets and assessing conformity.

Documentation and Training

ARB staff has developed extensive documentation for this model release to further assist the user in both running the program and understanding the technical foundation of the model. ARB will also be providing opportunities for EMFAC2002 training for new and experienced model users in the coming months.

Enclosure C provides a comprehensive list of the documentation covering the technical work and public process on model development since EMFAC7G. These materials include technical support documents; a User's Guide, the EMFAC2002 Release Document, workshop and Board meeting-related documents, and extensive technical memoranda. The list notes the electronic location of each document on ARB's EMFAC2002 web site. Paper copies are included with this transmittal for U.S. EPA's reference as well.

EMFAC2002 and MOBILE6

MOBILE6 is the most current software application program to estimate motor vehicle emissions developed and provided by U.S. EPA. MOBILE 6 and EMFAC2002 are similar in that they both provide estimates of current, past and future emissions from on-road motor vehicles. The two models are based on common sets of current empirical data, developed from research studies, surveys, and hundreds of vehicle emissions tests conducted by federal, State, and local agencies as well as private industry. Significant new knowledge has supported the concurrent update of both models.

Like MOBILE6, EMFAC2002 incorporates recent information on base emission rates, real-world driving cycles, speed and temperature correction, motor vehicle control

technologies, recently adopted emissions standards, and a multitude of other factors that influence motor vehicle emissions. Both models are compiled for use as desktop programs and have been designed to address a wide variety of emissions modeling needs. They are used to calculate emission rates, provide emissions inventories for air quality modeling, evaluate control strategies, make conformity determinations, and support development of regulations. Each model is a core element of SIP development under the Clean Air Act – EMFAC for California and MOBILE for the rest of the nation.

EMFAC2002 is tailored specifically to represent the many diverse regions of California. As a result, EMFAC2002 addresses regional variations in fleet composition, travel patterns, applicable regulations, temperatures, and other factors. Each vehicle technology group has populations with emission rates specific to five separate regimes (normal, moderate, high, very high and super emitters), allowing a stronger resolution of emission factors within groups. Because of its ability to produce a more detailed emission inventory over 45 model years using California conditions, regulations and region specific data, we believe EMFAC2002 is the best tool for motor vehicle emissions estimation in California.

Conclusion

In my April 26, 2002 letter, I outlined a schedule to expeditiously update California SIPs and their associated motor vehicle emissions budgets. The release of EMFAC2002 is a crucial step for meeting that goal, and expedited U.S. EPA action to approve the emission factor element of the model is essential for keeping both new air quality plans and needed conformity assessments on track. We are committed to working with U.S. EPA staff to support approval of EMFAC2002.

If you have any questions, please call me at (916) 445-4383, or Ms. Cynthia Marvin, Chief, Air Quality and Transportation Planning Branch, at (916) 322-7236.

Sincerely,

/s/

Michael P. Kenny
Executive Officer

Enclosures

cc: Ms. Cynthia Marvin (With Enclosures)
Air Resources Board